# FEEDING ALFALFA TO SOUTH CAROLINA DAIRY HERDS

Dr. Fred E. Pardue - Terry Sudduth

The nutritional value of alfalfa hay is important if it is to be used competitively with other feedstuffs in rations being fed to South Carolina Dairy Herds. Excellent quality hay has high nutrient concentration, digestibility and intake. The appearance of good physical characteristics of alfalfa hay as well as other hays and forages along with the knowledge of harvest dates, stages of maturity, and other conditions are not enough and can be deceiving. Therefore, forage testing is crucial and very important.

There are several nutritional factors that must be considered when evaluating alfalfa hay for dairy rations. These include crude protein, acid detergent fiber, neutral detergent fiber and calculated digestibility (TDN, RFV, etc.). The following table represents values that are being used to estimate quality of alfalfa hays.

RELATIONSHIP BETWEEN ALFALFA QUALITY AND VARIOUS NUTRITIONAL COMPONENTS

| | | Nutritional Components | | | | | |
|---|---|---|---|---|---|---|---|
| Grade | Description | Crude Protein % of Dry Matter | Crude Fiber[1] | Acid Detergent Fiber (ADF) | NDF | TDN[2] | RFV[3] |
| Prime | Legume-PB | 20 | 26 | 30 | 39 | 60 | 134 |
| 1 | Legume-EB 20% grass | 18 | 28 | 33 | 43 | 58 | 125 |
| 2 | Legume-MB 30% GRASS-EH | 14 | 31 | 37 | 39 | 54 | 111 |
| 3 | Legume-FB 40% grass-H | 12 | 34 | 41 | 53 | 51 | 100 |
| 4 | Legume-FB 50% grass-H | 8 | 37 | 44 | 64 | 49 | 88 |
| Fair | Grass-H (No legume) and/ or Rain damaged | 5 | 38 | 46 | 67 | 47 | 73 |

[1]Calculated Crude Fiber Values
[2]Calculated TDN Values
[3]Relative Feed Values (Minnesota Values)

As can be seen from the table, the nutritional value of an excellent quality alfalfa hay is (1) high in protein; (2) low in crude fiber, acid detergent fiber, neutral detergent fiber; (3) has a high digestible nutrient content; and, (4) has a high relative feed value. On the other hand, a low grade hay has the opposite values. The importance of knowing the nutritional value of alfalfa hay cannot be over emphasized. It is particularly important when buying and selling alfalfa hay.

The hay that is marketed must be of excellent quality to insure creditability between the buyer and seller. The ultimate way to measure the quality of the alfalfa hay as well as other feeds is through the level of milk production on the dairy farm. Usually a dairyman who receives a load of hay with undesirable physical characteristics and one that the cows won't eat, normally assumes and associates low milk production with it. Although visible characteristics such as color, leaf content, the presence of no mold, etc. are important, nutritional values are essential. When compared to low quality forages, excellent alfalfa hay benefits cows by reducing grain needs, increasing milk production, and providing more calcium as well as other minerals and vitamins. The "alfalfa advantage" can be seen in the following table which compares nutritional values of alfalfa hay and corn silage.

COMPARISON OF ALFALFA HAY AND CORN SILAGE[1]

| | Alfalfa (late vegetative) % of Dry Matter | Corn Silage (well eared) | Alfalfa Advantage |
|---|---|---|---|
| Crude Protein | 19.9% | 8.0% | ++++ |
| Crude Fiber | 27.0% | 24.0% | - |
| ADF | 34.0% | 31.0% | - |
| Cell Walls | 44.0% | 51.1% | +++ |
| TDN | 62.0% | 70.0% | -- |
| Calcium | 2.12% | .27% | ++ |
| Phosphorus | .30% | .20% | + |
| Sulfur | .30% | .08% | +++ |
| Magnesium | .25% | .28% | 0 |
| Potassium | 2.21% | 1.05% | ++ |
| Iron | 250 ppm | 640 ppm | 0 |
| Copper | 21.7 ppm | 13.2 ppm | + |
| Cobalt | .096 ppm | .06 ppm | 0 |
| Manganese | 34 ppm | 34 ppm | 0 |
| Zinc | 17 ppm | 21 ppm | 0 |
| Vitamin A | 72 ppm | 18 ppm | +++ |

[1]Values taken from Nutrient Requirements of Dairy Cattle, Fifth Revised Edition, 1978.

High quality alfalfa hay as reflected in the above comparison illustrate why the addition of alfalfa to the dairy ration can be helpful. The inclusion of five-eight pounds of long stem alfalfa hay can supply many of these minor nutritional components that are not supplied by corn silage and other similar forages.

When marketing hay for dairy cows, the protein content is important as well as the fiber content and the resulting energy or relative feed value. Therefore, the main factors that must be considered before buying alfalfa hay for inclusion in the dairy ration are the nutritive values and economics. The following table was adopted by a workman from the University of Minnesota for determining a price for alfalfa hay based on nutritive components

of the hay as well as the market price. This price is derived from a comparison of the going price of corn and soybean oil meal.

| Grade | Description | Nutritional Components: Crude Protein | ADF | NDF | RFV | Substitution Value: Corn $2.25/bu. s.o.m. $8.25 cwt | Corn $3.25/bu. |
|---|---|---|---|---|---|---|---|
| Prime | Legume, PB | 20 | 31 | 39 | 134 | $127 | $144 |
| 1 | Legume, EB, 20% grass | 18 | 33 | 43 | 125 | 114 | 130 |
| 2 | Legume, MB, 30% grass (EH) | 14 | 37 | 49 | 111 | 93 | 110 |
| 3 | Legume, FB, 40% grass (H) | 12 | 41 | 53 | 100 | 77 | 95 |
| 4 | Legume, FB, 50% grass (H) | 8 | 44 | 64 | 88 | 49 | 69 |
| Fair | Grass (H), (No legume) and/or rain damaged | 5 | 46 | 67 | 73 | 35 | 56 |

The Clemson University Dairy Herd Improvement Association feed formulation program was used to formulate eight dairy rations. These are shown in pages 42-49. These rations were formulated and balanced on the least cost basis for a 1,300 pound Holstein producing 60 pounds of 3.6% milk.

Ration formulation 1 was balanced and formulated with the following considerations:

| | |
|---|---|
| Corn Silage (Good quality) | $30.00 per ton |
| Shelled Corn | $ 2.25 per bushel |
| Soybean Meal (44% CP) | $220.00 per ton |
| Alfalfa Hay (Excellent quality) | $ ? per ton |

The ration included the following feed ingredients:

| | Lbs/Cow/Day |
|---|---|
| Corn Silage | 76 |
| Shelled Corn | 8.5 |
| Soybean Meal (44%) | 9.0 |
| Minerals | .8 |
| Feed Cost/Cow/Day | $2.61 |
| Alfalfa hay value (shadow price) | $123.00/ton |

Ration 2 was formulated substituting Grade 2 alfalfa hay for prime alfalfa hay. The nutritional value for Grade 2 alfalfa hay was computed to have a shadow value price of $103.00 per ton.

Ration 3 was formulated placing prime alfalfa hay in the feed ingredient selection list at an assigned price of $75.00 per ton. The formulated ration included the following ingredients:

| | Lbs/Cow/Day |
|---|---|
| Alfalfa Hay (Prime) | 28.0 |
| Shelled Corn | 19.6 |
| Minerals | .68 |
| Feed Cost/Cow/Day | $1.98 |

Although this ration is not very practical, it does illustrate that when the price is right, alfalfa hay can and will be used in dairy rations.

A more practical ration is shown in ration 4. This ration was formulated placing a restriction on the amount fed of 12 pounds/cow/day on the prime alfalfa hay with an assigned value of $75.00/ton. The formulated ration included:

| | Lbs/Cow/Day |
|---|---|
| Corn Silage | 43.0 |
| Shelled Corn | 13.4 |
| Soybean Meal (44%) | 5.2 |
| Alfalfa Hay (Prime) | 12.0 |
| Minerals | .67 |
| Feed Cost/Cow/Day | $2.33 |

This is a very sound ration and could result in a savings of $1,350.00 per month for an average dairy herd in South Carolina (150 milk cows). [$2.62 - 2.33 = $0.29/cow/day. .29 x 150 cows x 30 days = $1,350.00.]

Ration 5 was formulated placing prime alfalfa hay in the feed ingredient selection list at an assigned price of $120.00/ton. At this price, the maximum limited amount of prime alfalfa hay will be utilized in the formulation. The following ingredients were included:

| | Lbs/Cow/Day |
|---|---|
| Corn Silage | 43.2 |
| Shelled Corn | 13.2 |
| Soybean Meal (44%) | 5.2 |
| Alfalfa Hay (Prime) | 12.0 |
| Minerals | .67 |
| Feed Cost/Cow/Day | $2.60 |
| Whole Cottonseed Value (Shadow price) | $148.00/ton |

Ration 6 was formulated increasing the value of the assigned price of prime alfalfa hay to $125.00/ton. At this price, prime alfalfa hay was left out of the formulated ration and was assigned a shadow price value of $123.00/ton. The following ingredients were included:

| | Lbs/Cow/Day |
|---|---|
| Corn silage | 76 |
| Shelled Corn | 8.5 |
| Soybean Meal (44%) | 9.0 |
| Minerals | .83 |
| Feed Cost/Cow/Day | $2.61 |

Ration 7 was formulated increasing the value of the assigned price of corn to $2.75/bushel and soybean meal to $275.00/ton. In view of these two changes, the shadow price of alfalfa hay will increase to $134.00/ton as compared to $123.00/ton in ration 1. The following ingredients were included:

| | Lbs/Cow/Day |
|---|---|
| Corn Silage | 76 |
| Shelled Corn | 8.5 |
| Soybean Meal (44%) | 9.0 |
| Minerals | .83 |
| Feed Cost/Cow/Day | $2.94 |

Ration 8 was formulated decreasing the value of the assigned price of whole cottonseed to $75.00/ton. This formulation shows that prime alfalfa hay will have to be priced such that it is competitive with other feeds like whole cottonseed, etc.

| | Lbs/Cow/Day |
|---|---|
| Corn Silage | 69.7 |
| Shelled Corn | 5.9 |
| Soybean Meal (44%) | 7.5 |
| Whole Cottonseed | 5.1 |
| Minerals | .81 |
| Feed Cost/Cow/Day | $2.44 |
| Alfalfa Hay value (shadow price) | $126.00/ton |

In summary and conclusion, the prerequisite for South Carolina dairymen to purchase alfalfa hay, the following factors must be met:

1) Must be of excellent quality and of high nutritive value. (Prime and Grade 1)

2) Transportation costs must be reasonable. At present, the transportation charge is $25 - $35 per ton on alfalfa hay that is being delivered from Kentucky. This charge can be the limiting economic factor to whether a South Carolina dairyman will include alfalfa hay within his feeding program. It also costs just as much to transport poor quality hay as it does excellent quality hay. In the ration formulations presented and discussed earlier, the assigned price for computed shadow prices included the cost of the hay plus the transportation cost.

3) Must be competitive in price with feeds and forages (silage and other hays) available in South Carolina. Row

crop growers in South Carolina are also looking at other alternatives for cash crops. Several of these alternatives are the production of alfalfa, grass hay, and silage. With the production of these cash crops, alfalfa hay produced in Kentucky and transported to South Carolina will have to be competitive in price.

4) South Carolina dairymen had rather buy hay on a guaranteed value. Therefore, the dairyman knows what he is buying and the seller gets rewarded or penalized for his management ability.

5) The dairy feeding facility and feeding equipment must be of design such that hay can be handled and fed. South Carolina dairymen feed predominantly silage for the forage portion of the ration. On average, the South Carolina dairy cow receives 17,000 lbs. of silage, 1,900 lbs. of hay, and 5,800 lbs. of grain, and limited grazing per year. The South Carolina dairyman believes that at least five pounds of long stem fiber is desirable in the ration, and prime alfalfa hay could supply this requirement as well as reduce the amount of silage and grain fed in the ration.

6) With the predominance of the drought growing conditions within South Carolina, forages grown are often of inferior quality and limited quantity. Therefore, additional forages must be purchased, and it is of most importance that they be of high nutritive quality so that milk production levels can be maintained.

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. Bldg.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 1

For HERD set FPARDUE, using FEED set ALFALFA

Number of Cows -: 100
Av. body weight-: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk Price -: $14.00
Lead factor-: 1.1

Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 900.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.1 | 60 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |

FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS: | |
|---|---|---|---|---|
| D.M. Intake | 42.9 lbs | 3.3 %BW | 3.2 %BW | |
| Crude Protein | 6.7 lbs | 15.6 PCT | 15.6 PCT | |
| Crude Fiber | 6.8 lbs | 15.9 PCT | 15.9 PCT | |
| NE (MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb | |
| Calcium | 129.2 GMS | 0.66 PCT | 0.66 PCT | |
| Phosphorus | 95.7 GMS | 0.49 PCT | 0.49 PCT | |
| Sodium | 34.9 GMS | 0.18 PCT | 0.18 PCT | |
| Magnesium | 38.7 GMS | 0.20 PCT | 0.20 PCT | |
| Sulfur | 40.8 GMS | 0.21 PCT | 0.21 PCT | |
| Potassium | 199.2 GMS | 1.02 PCT | 0.79 PCT | |

FEED COSTS:
Per Cow Per Day: $ 2.62

RETURN ABOVE FEED COSTS:
Per Cow: $ 5.78
Per CWT Milk: $ 9.64

FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-Corn Silage | | 75.8253 |
| 410-Corn Grain. Grou | | 8.5156 |
| 537-44% Soybean Meal | | 8.9773 |
| 604-DICAL | *** | 0.4639 |
| 606-LIME | *** | 0.2649 |
| 612-T M Salt | *** | 0.0932 |
| 608-Magnesium OX | *** | 0.0050 |

NOTE: Add enough Vit A,D,E, Supp. to supply 64,000 IU of Vit A/Cow/Day

Blended ration cost per ton: $ 55.55

Economic Analysis:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 313-CORN SILAGE | | 155.78 | 30.00 | 24.50 |
| 410-CORN GRAIN. GROU | | 99.92 | 80.36 | 44.85 |
| 537-44% SOYBEAN MEAL | | 405.76 | 220.00 | 86.07 |
| 604-DICAL | *** | 5,531.20 | 400.00 | 202.34 |
| 606-LIME | *** | 613.04 | 300.00 | 21.04 |
| 612-T M SALT | *** | 3,284.77 | 300.00 | -0.01 |
| 608-MAGNESIUM OX | *** | 2,059.93 | 600.00 | 4.27 |

COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 104-ALFALFA HAY M.B. | 900.00 | 122.80 | 777.20 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 2

For HERD set FPARDUE, using FEED set ALFALFA

Number of cows -: 100
Av. body weight-: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk price -: $14.00
Lead factor-: 1.1

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Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 900.00 | 0.0 | 12.0 | 89.2 | 14.0 | 31.4 | 54 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |

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FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS |
|---|---|---|---|
| D.M. Intake | 42.9 lbs | 3.3 %BW | 3.2 %BW |
| Crude Prot. | 6.7 lbs. | 15.6 PCT | 15.6 PCT |
| Crude Fiber | 6.8 lbs | 15.9 PCT | 15.9 PCT |
| NE (MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb |
| Calcium | 129.2 GMS | 0.66 PCT | 0.66 PCT |
| Phosphorus | 95.7 GMS | 0.49 PCT | 0.49 PCT |
| Sodium | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| Magnesium | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| Sulfur | 40.8 GMS | 0.21 PCT | 0.20 PCT |
| Potassium | 199.2 GMS | 1.02 PCT | 0.79 PCT |

FEED COSTS:
Per Cow
Per Day: $ 2.62

Return Above Feed Costs:
Per Cow: $ 5.78
Per CWT
Milk: $ 9.64

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FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-Corn Silage | | 75.8253 |
| 410-Corn Grain. Grou | | 8.5156 |
| 537-44% Soybean Meal | | 8.9773 |
| 604-DICAL | *** | 0.4640 |
| 606-LIME | *** | 0.2649 |
| 612-T M SALT | *** | 0.0932 |
| 608-Magnesium OX | ** | 0.0050 |

NOTE: Add enough Vit. A,D,E, Supp. to supply 64,000 IU of Vit A/Cow/Day

Blended Ration Cost Per Ton: $ 55.35

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ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 313-Corn Silage | | 155.78 | 30.00 | 24.50 |
| 410-Corn Grain. Grou | | 99.92 | 80.36 | 44.86 |
| 537-44% Soybean Meal | | 405.72 | 220.00 | 86.07 |
| 604-DICAL | *** | 5,530.97 | 400.00 | 202.34 |
| 606-LIME | *** | 613.04 | 300.00 | 21.06 |
| 612-T M SALT | *** | 3,284.76 | 300.00 | 0.00 |
| 608-Magnesium OX | *** | 2,059.89 | 600.00 | 4.27 |

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COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 104-ALFALFA HAY M.B. | 900.00 | 103.45 | 796.55 |

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DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 3

For HERD set FPARDUE, using FEED set ALFALFA

Number of cows -: 100
Av. body weight -: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk price -: $14.00
Lead factor -: 1.1

Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 75.00 | 0.0 | 0.0 | 89.2 | 20.0 | 26.1 | 60 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |

FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|
| D.M. INTAKE | 43.2 lbs | 3.3 %BW | 3.2 % BW |
| CRUDE PROT. | 6.7 lbs. | 15.5 PCT | 15.5 PCT |
| CRUDE FIBER | 6.9 lbs. | 16.0 PCT | 15.8 PCT |
| NE (MICAL) | 32.0 MCAL | 0.74 /lb | 0.74 /lb |
| CALCIUM | 168.0 GMS | 0.86 PCT | 0.66 PCT |
| PHOSPHORUS | 95.7 GMS | 0.49 PCT | 0.49 PCT |
| SODIUM | 34.8 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| SULFUR | 41.9 GMS | 0.21 PCT | 0.20 PCT |
| POTASSIUM | 251.9 GMS | 1.28 PCT | 0.79 PCT |

FEED COSTS:
Per Cow
Per Day: $ 1.98

RETURN ABOVE FEED COSTS:
Per Cow: $ 6.42
Per CWT
Milk: $ 10.70

FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 410-Corn Grain. | Grou | 19.6277 |
| 104-Alfalfa Hay. | M.B. | 28.1424 |
| 604-DICAL | *** | 0.6177 |
| 612-T M SALT | *** | 0.0540 |
| 608-Magnesium OX | *** | 0.0105 |

NOTE: Add enough Vit A, D, E, supp. to supply 64,000 IU of Vit A/cow/day

Blended Ration cost per ton: $ 81.68

ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 410-Corn Grain. | Grou | 103.72 | 80.36 | 38.40 |
| 104-Alfalfa Hay | M.B. | 101.37 | 75.00 | 56.21 |
| 604-DICAL | *** | 4,862.16 | 400.00 | 25.95 |
| 612-T M SALT | *** | 5,903.06 | 300.00 | -0.01 |
| 608-Magnesium OX | *** | 2,059.56 | 600.00 | 3.86 |

COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 313-Corn Silage | 30.00 | 23.57 | 6.43 |
| 537-44% Soybean Meal | 220.00 | 140.86 | 79.14 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 4

For HERD set FPARDUE, using FEED set ALFALFA

| | | | |
|---|---|---|---|
| Number of cows -: | 100 | Av. % fat -: | 3.6 |
| Av. body weight -: | 1300 | Milk price -: | $14.00 |
| Av. daily milk -: | 60 | Lead factor -: | 1.1 |

Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 75.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.1 | 60 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |

FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|---|
| D.M. INTAKE | 42.9 lbs | 3.3 %BW | 3.2 %BW |
| CRUDE PROT. | 6.7 lbs | 15.7 PCT | 15.7 PCT |
| CRUDE FIBER | 6.8 lbs | 15.9 PCT | 15.9 PCT |
| NE (MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb |
| CALCIUM | 129.2 GMS | 0.66 PCT | 0.66 PCT |
| PHOSPHORUS | 95.7 GMS | 0.49 PCT | 0.49 PCT |
| SODIUM | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| SULFUR | 41.2 GMS | 0.21 PCT | 0.20 PCT |
| POTASSIUM | 221.1 GMS | 1.13 PCT | 0.79 PCT |

FEED COSTS:
Per Cow
Per Day: $ 2.33

RETURN ABOVE FEED COSTS:
Per Cow: $ 6.07
Per CWT
Milk: $ 10.12

FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-CORN SILAGE | | 43.0027 |
| 410-CORN GRAIN. GROU | | 13.3917 |
| 537-44% SOYBEAN MEAL | | 5.1520 |
| 104-ALFALFA HAY M.B. | | 12.0000 |
| 604-DICAL | *** | 0.5295 |
| 606-LIME | *** | 0.0515 |
| 612-T M SALT | *** | 0.0767 |
| 608-MAGNESIUM OX | *** | 0.0110 |

NOTE: Add enough Vit A, D, E, Supp. to supply 64,000 IU of Vit A/Cow/Day

Blended ration cost per ton: $ 62.74

ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 313-CORN SILAGE | | 155.78 | 30.00 | 24.50 |
| 410-CORN GRAIN. GROU | | 99.92 | 80.36 | 44.85 |
| 537-44% SOYBEAN MEAL | | 405.76 | 220.00 | 86.07 |
| 104-ALFALFA HAY M.B. | | 122.80 | 75.00 | 0.00 |
| 604-DICAL | *** | 5,531.21 | 400.00 | 202.34 |
| 606-LIME | *** | 613.04 | 300.00 | 21.04 |
| 612-T M SALT | *** | 3,284.77 | 300.00 | -0.01 |
| 608-MAGNESIUM OX | *** | 2,059.93 | 600.00 | 4.26 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLD.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 5

For HERD set FPARDUE, using FEED set ALFALFA

Number of cows -: 100
Av. body weight -: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk price -: $14.00
Lead factor -: 1.1

Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 120.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.0 | 61 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |
| 510 | 900.00 | 0.0 | 0.0 | 91.0 | 22.5 | 21.0 | 98 | 0.08 | 0.50 | 0.20 | 0.30 | 0.32 | 0.90 | F |

FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|---|
| D.M. INTAKE | 42.8 lbs | 3.3 %BW | 3.2 %BW |
| CRUDE PROT. | 6.7 lbs. | 15.7 PCT | 15.7 PCT |
| CRUDE FIBER | 6.8 lbs. | 15.9 PCT | 15.9 PCT |
| NE (MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb |
| CALCIUM | 129.2 GMS | 0.66 PCT | 0.66 PCT |
| PHOSPHORUS | 95.6 GMS | 0.49 PCT | 0.49 PCT |
| SODIUM | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| SULFUR | 41.2 GMS | 0.21 PCT | 0.20 PCT |
| POTASSIUM | 221.4 GMS | 1.14 PCT | 0.80 PCT |

FEED COSTS:
Per Cow
Per Day: $ 2.60

RETURN ABOVE FEED COSTS:
Per Cow: $ 5.80
Per CWT
Milk: $ 9.67

FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-CORN SILAGE | | 43.1580 |
| 410-CORN GRAIN. GROU | | 13.1755 |
| 537-44% SOYBEAN MEAL | | 5.1859 |
| 104-ALFALFA HAY M.B. | | 12.0000 |
| 604-DICAL | *** | 0.5300 |
| 606-LIME | *** | 0.0507 |
| 612-T M SALT | *** | 0.0765 |
| 608-MAGNESIUM OX | *** | 0.0110 |

NOTE: ADD ENOUGH VIT A,D,E SUPP. TO SUPPLY 64,000 IU OF VIT A/COW/DAY

BLENDED RATION COST PER TON: $ 69.97

ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|
| 313-CORN SILAGE | 155.78 | 30.00 | 28.81 |
| 410-CORN GRAIN. GROU | 88.73 | 80.36 | 44.85 |
| 537-44% SOYBEAN MEAL | 405.73 | 220.00 | 209.71 |
| 104-ALFALFA HAY M.B. | 123.25 | 120.00 | 0.00 |
| 604-DICAL *** | 987.04 | 400.00 | 202.34 |
| 606-LIME *** | 613.03 | 300.00 | 117.99 |
| 612-T M SALT *** | 3,284.74 | 300.00 | 0.00 |
| 608-MAGNESIUM OX *** | 2,059.88 | 600.00 | 4.22 |

COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 510-WHOLE COTTONSEED | 900.00 | 147.80 | 752.20 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY CLEMSON S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 6

For HERD set FPARDUE, using FEED set ALFALFA

Number of cows -: 100
Av. body weight -: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk price -: $14.00
Lead factor -: 1.1

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Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 125.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.0 | 61 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |
| 510 | 900.00 | 0.0 | 0.0 | 91.0 | 22.5 | 21.0 | 98 | 0.08 | 0.50 | 0.20 | 0.30 | 0.32 | 0.90 | F |

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FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|---|
| D.M. INTAKE | 42.9 lbs | 3.3 %BW | 3.2 %BW |
| CRUDE PROTEIN | 6.7 lbs | 15.6 PCT | 15.6 PCT |
| CRUDE FIBER | 6.8 lbs | 15.9 PCT | 15.9 PCT |
| NE(MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb |
| CALCIUM | 129.2 GMS | 0.66 PCT | 0.66 PCT |
| PHOSPHORUS | 95.6 GMS | 0.49 PCT | 0.49 PCT |
| SODIUM | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| SULFUR | 40.8 GMS | 0.21 PCT | 0.20 PCT |
| POTASSIUM | 199.2 GMS | 1.02 PCT | 0.79 PCT |

FEED COSTS:
PER COW
PER DAY: $ 2.61

RETURN ABOVE FEED COSTS:
PER COW: $ 5.79
PER CWT
MILK: $ 9.64

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FEED PER DAY (LBS)

| | FEED PER COW |
|---|---|
| 313-CORN SILAGE | 75.8253 |
| 410-CORN GRAIN. GROU | 8.5156 |
| 537-44% SOYBEAN MEAL | 8.9773 |
| 604-DICAL *** | 0.4635 |
| 606-LIME *** | 0.2652 |
| 612-T M SALT *** | 0.0932 |
| 608-MAGNESIUM OX *** | 0.0050 |

NOTE: ADD ENOUGH VIT A,D,E, SUPP. TO SUPPLY 64,000 IU OF VIT A/COW/DAY

BLENDED RATION COST PER TON: $ 55.55

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ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|
| 313-CORN SILAGE | 30.64 | 30.00 | 24.50 |
| 410-CORN GRAIN. GROU | 99.91 | 80.36 | 75.86 |
| 537-44% SOYBEAN MEAL | 225.53 | 220.00 | 86.07 |
| 604-DICAL *** | 5,532.89 | 400.00 | 202.34 |
| 606-LIME *** | 397.77 | 300.00 | 21.06 |
| 612-T M SALT *** | 1,551.42 | 300.00 | 0.00 |
| 608-MAGNESIUM OX *** | 2,059.92 | 600.00 | 4.25 |

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COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 104-ALFALFA HAY M.B. | 125.00 | 123.25 | 1.75 |
| 510-WHOLE COTTONSEED | 900.00 | 147.80 | 752.20 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY, CLEMSON, S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 7

For HERD set FPARDUE, using FEED set ALFALFA

| | | | |
|---|---|---|---|
| Number of cows -: | 100 | Av. % fat -: | 3.6 |
| Av. body weight -: | 1300 | Milk price -: | $14.00 |
| Av. daily milk -: | 60 | Lead factor -: | 1.1 |

Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | CA | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.01 | 0.16 | 0.15 | 0.90 | F |
| 410 | 98.21 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 275.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 900.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.0 | 61 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |
| 510 | 900.00 | 0.0 | 0.0 | 91.0 | 22.5 | 21.0 | 98 | 0.08 | 0.50 | 0.20 | 0.30 | 0.32 | 0.90 | F |

FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|
| D.M. INTAKE | 42.9 lbs | 3.3 %BW | 3.2 %BW |
| CRUDE PROT. | 6.7 lbs | 15.6 PCT | 15.6 PCT |
| CRUDE FIBER | 6.8 lbs | 15.9 PCT | 15.9 PCT |
| NE (MCAL) | 32.0 MCAL | 0.75 /lb | 0.75 /lb |
| CALCIUM | 129.2 GMS | 0.66 PCT | 0.66 PCT |
| PHOSPHORUS | 95.6 GMS | 0.49 PCT | 0.49 PCT |
| SODIUM | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 38.7 GMS | 0.20 PCT | 0.20 PCT |
| SULFUR | 40.8 GMS | 0.21 PCT | 0.20 PCT |
| POTASSIUM | 199.2 GMS | 1.02 PCT | 0.79 PCT |

FEED COSTS:
PER COW
PER DAY: $ 2.94

RETURN ABOVE FEED COSTS:
PER COW: $ 5.46
PER CWT
MILK: $ 9.10

FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-CORN SILAGE | | 75.8253 |
| 410-CORN GRAIN. GROU | | 8.5156 |
| 537-44% SOYBEAN MEAL | | 8.9774 |
| 604-DICAL | *** | 0.4635' |
| 606-LIME | *** | 0.2652 |
| 612-T M SALT | *** | 0.0932 |
| 608-MAGNESIUM OX | *** | 0.0050 |

NOTE: ADD ENOUGH VIT A,D,E SUPP. TO SUPPLY 64,000 IU OF VIT A/COW/DAY

BLENDED RATION COST PER TON: $ 62.41

ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 313-CORN SILAGE | | 155.69 | 30.00 | 29.81 |
| 410-CORN GRAIN. GROU | | 98.88 | 98.21 | 55.37 |
| 537-44% SOYBEAN MEAL | | 310.34 | 275.00 | 98.64 |
| 604-DICAL | *** | 7,158.97 | 400.00 | 202.34 |
| 606-LIME | *** | 400.32 | 300.00 | 21.06 |
| 612-T M SALT | *** | 3,284.74 | 300.00 | 0.00 |
| 608-MAGNESIUM OX | *** | 1,033.67 | 600.00 | 4.27 |

COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 104-ALFALFA HAY M.B. | 900.00 | 133.70 | 766.30 |
| 510-WHOLE COTTONSEED | 900.00 | 168.26 | 731.74 |

DHIA FEED FORMULATION REPORT

FRED PARDUE
119 P.A. BLDG.
CLEMSON UNIVERSITY, CLEMSON S.C., SOUTH CAROLINA 29631

RATION FORMULATION NO. 8

For HERD set FPARDUE, using FEED set ALFALFA

Number of cows -: 100
Av. body weight -: 1300
Av. daily milk -: 60
Av. % fat -: 3.6
Milk price -: $14.00
Lead factor-: 1.1

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Feed file ingredients:

| FEED # | PRICE | *LIMITS* MIN. | MAX. | DM | CP | FIB | TDN | Ca | P | Na | Mg | S | K | FEED TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 313 | 30.00 | 0.0 | 0.0 | 35.0 | 7.6 | 23.0 | 68 | 0.20 | 0.18 | 0.18 | 0.16 | 0.15 | 0.90 | F |
| 410 | 80.36 | 0.0 | 0.0 | 89.0 | 9.7 | 2.0 | 88 | 0.02 | 0.25 | 0.01 | 0.10 | 0.14 | 0.30 | F |
| 537 | 220.00 | 0.0 | 0.0 | 89.0 | 49.6 | 7.0 | 81 | 0.36 | 0.75 | 0.31 | 0.30 | 0.49 | 2.21 | F |
| 104 | 900.00 | 0.0 | 12.0 | 89.2 | 20.0 | 26.0 | 61 | 0.90 | 0.22 | 0.15 | 0.23 | 0.27 | 2.00 | F |
| 510 | 75.00 | 0.0 | 0.0 | 91.0 | 22.5 | 21.0 | 98 | 0.08 | 0.50 | 0.20 | 0.30 | 0.32 | 0.90 | F |

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FEEDING PROGRAM:

| | *** TOTAL RATION *** DRY MATTER CONTAINS: | | COMPUTED MINIMUM REQUIREMENTS: |
|---|---|---|---|
| D.M. INTAKE | 41.7 lbs | 3.2 %BW | 3.2 %BW |
| CRUDE PROT. | 6.7 lbs | 16.1 PCT | 16.1 PCT |
| CRUDE FIBER | 7.2 lbs. | 17.1 PCT | 16.3 PCT |
| NE (MCAL) | 32.0 MCAL | 0.77 /lb | 0.77 /lb |
| CALCIUM | 129.2 GMS | 0.68 PCT | 0.68 PCT |
| PHOSPHORUS | 95.6 GMS | 0.50 PCT | 0.50 PCT |
| SODIUM | 34.9 GMS | 0.18 PCT | 0.18 PCT |
| MAGNESIUM | 39.5 GMS | 0.21 PCT | 0.20 PCT |
| SULFUR | 41.6 GMS | 0.22 PCT | 0.20 PCT |
| POTASSIUM | 193.0 GMS | 1.02 PCT | 0.82 PCT |

FEED COSTS:
PER COW
PER DAY: $ 2.44

RETURN ABOVE FEED COSTS:
PER COW: $ 5.96
PER CWT
MILK: $ 9.93

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FEED PER DAY (LBS)

| | | FEED PER COW |
|---|---|---|
| 313-CORN SILAGE | | 69.6923 |
| 410-CORN GRAIN. GROU | | 5.8935 |
| 537-44% SOYBEAN MEAL | | 7.5023 |
| 510-WHOLE COTTONSEED | | 5.0825 |
| 604-DICAL | *** | 0.4437 |
| 606-LIME | *** | 0.2937 |
| 612-T M SALT | *** | 0.0824 |

NOTE: ADD ENOUGH VIT A,D,E, SUPP. TO SUPPLY 62,000 IU OF VIT A/COW/DAY

BLENDED RATION COST PER TON: $ 54.91

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ECONOMIC ANALYSIS:

PRICE/TON AT WHICH AMOUNTS OF FEED IN RATION WILL INCREASE OR DECREASE

| INGREDIENTS | | DECREASE | ASSIGNED PRICE | INCREASE |
|---|---|---|---|---|
| 313-CORN SILAGE | | 30.56 | 30:00 | 24.62 |
| 410-CORN GRAIN. GROU | | 99.13 | 80.36 | 79.05 |
| 537-44% SOYBEAN MEAL | | 270.47 | 220.00 | 85.29 |
| 510-WHOLE COTTONSEED | | 95.43 | 75.00 | -789.15 |
| 604-DICAL | *** | 1,209.32 | 400.00 | 224.50 |
| 606-LIME | *** | 508.17 | 300.00 | 63.36 |
| 612-T M SALT | *** | 2,956.29 | 300.00 | 57.52 |

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COMPETITIVE PRICE/TON FOR FEEDS NOT INCLUDED IN THIS RATION

| INGREDIENTS | ASSIGNED PRICE | NUTRITIONAL VALUE | PENALTY VALUE |
|---|---|---|---|
| 104-ALFALFA HAY M.B. | 900.00 | 125.71 | 774.29 |